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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/582,297

10/02/2007

Luc Joly

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EXAMINER

KING, RODNEY P

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/582,297	<b>Applicant(s)</b> JOLY, LUC	
	<b>Examiner</b> RODNEY KING	<b>Art Unit</b> 3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 October 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/12/06</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishiguro (US 4,967,127 A), further in view of Penkar (US 4,773,025 A) and Gunnarsson (US 2004/0093119 A1).

Referring to Claim 1: Ishiguro discloses a method of controlling the displacements of a moving portion of a multi-axis robot along a path, the method being characterized in that it comprises the steps consisting in:

providing movement instructions to a path generator, the instructions including at least information relating to the shape of the path and to force setpoints (Col. 11, line 34—Col. 5, line 13);

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calculating an external force signal representing at least one component of the force (F) exerted by said moving portion (O) on its environment (Col. 7, line 50 - Col. 9, line 67);

delivering said movement setpoints to a servo-control means enabling at least one axis of said robot to be set into movement in compliance with said movement setpoints (Col. 5, line 41 – Col. 6, line 2).

Ishiguro does not disclose the method of calculating, with said path generator, movement setpoints along said path in such a manner as to minimize the difference between the projection (FT) onto the tangent (T) of the path and the projection of the setpoint onto said tangent. However, Gunnarsson discloses calculating reference points along a generated path, the tangent to the path, and the plane which is at right angles to the tangent to minimize path deviation for an axis [0048 - 0063]. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the features of Gunnarsson's calculation method with Ishiguro's multi-axis robot control method to increase the accuracy in the movements of the robot. This method for improving the method of Ishiguro was within the ordinary ability of one of ordinary skill in the art based on the teachings of Gunnarsson.

Neither Ishiguro nor Gunnarsson disclose the method of acting at a predetermined sampling frequency, however, Penkar discloses controlling torque of all robot axes within sampling requirements (Col. 24, lines 38-42). At the time of the invention, it

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would have been obvious to a person of ordinary skill in the art to use the features of Penkar's torque control method with Ishiguro's multi-axis robot control method and Gunnarsson's calculation method to generate position commands and define a tool tip trajectory corresponding to the curved path of the robot. This method for improving the method of Ishiguro was within the ordinary ability of one of ordinary skill in the art based on the teachings of Penkar.

Referring to Claim 2: Ishiguro, Gunnarsson, and Penkar disclose all of the limitations of Claim 1. Penkar further discloses that said external force signal is calculated from information representing the current flowing in at least one actuator of said robot (Col. 2, line 63-67; Col. 6, lines 26-41).

Referring to Claim 3: Ishiguro, Gunnarsson, and Penkar disclose all of the limitations of Claim 1. Ishiguro further discloses that the method includes a step consisting in using a dynamic model of said robot while calculating said external force signal (Throughout).

Referring to Claim 4: Ishiguro, Gunnarsson, and Penkar disclose all of the limitations of Claim 1. Penkar further discloses that the method includes a step consisting in supplying said path generator with at least one velocity limit value and/or at least one

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acceleration limit value for taking into account while calculating said movement setpoints, such that said setpoints comply with said limit value(s) (Col. 5, lines 27-40).

Referring to Claim 5: Ishiguro discloses an Apparatus for controlling the displacements of a moving portion of a multi -axis robot along a path, the apparatus being characterized in that it comprises:

a path generator suitable for calculating movement setpoints as a function of movement instructions including at least information relating to the shape of the path and to its force setpoints; and

a force estimator suitable for generating an external force signal representing at least one component of the force ( $F$ ) exerted by said moving portion ( $O$ ) on its environment and for delivering said signal to said path, where said path generator is suitable for calculating said movement setpoints along said generator.

Ishiguro does not disclose that said path generator calculates movement setpoints along said path in such a manner as to minimize the difference between the projection ( $FT$ ) onto the tangent ( $T$ ) of the path and the projection of the setpoint onto said tangent. However, Gunnarsson discloses a generator for calculating reference points along a

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generated path, the tangent to the path, and the plane which is at right angles to the tangent to minimize path deviation for an axis [0048 - 0063]. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the features of Gunnarsson's generator with Ishiguro's multi-axis robot controller to increase the accuracy in the movements of the robot. This method for improving the method of Ishiguro was within the ordinary ability of one of ordinary skill in the art based on the teachings of Gunnarsson.

Neither Ishiguro nor Gunnarsson disclose the method of acting at a predetermined sampling frequency, however, Penkar discloses a torque processor that controls all robot axes within sampling requirements (Col. 24, lines 38-42). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the features of Penkar's torque processor with Ishiguro's multi-axis robot controller and Gunnarsson's generator to generate position commands and define a tool tip trajectory corresponding to the curved path of the robot. This method for improving the method of Ishiguro was within the ordinary ability of one of ordinary skill in the art based on the teachings of Penkar.

Referring to Claim 6: Ishiguro, Gunnarsson, and Penkar disclose all of the limitations of Claim 5. Ishiguro further discloses it comprises program interpreter means suitable for

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executing programs containing movement instructions enabling at least the shape of the path and force setpoints to be specified.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following references are cited to further show the state of the art with respect to the data recording apparatus:

U.S. Patent Publication No. 2003/0200042 A1 discloses a relative calibration system and method for robot workcell calibration capable of correcting errors between the robot tool center point and the work-object frame.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY KING whose telephone number is (571) 270-7823. The examiner can normally be reached on 7:30am - 5:00pm Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi Tran can be reached on (571) 272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KHOI TRAN/

Supervisory Patent Examiner, Art Unit 3664